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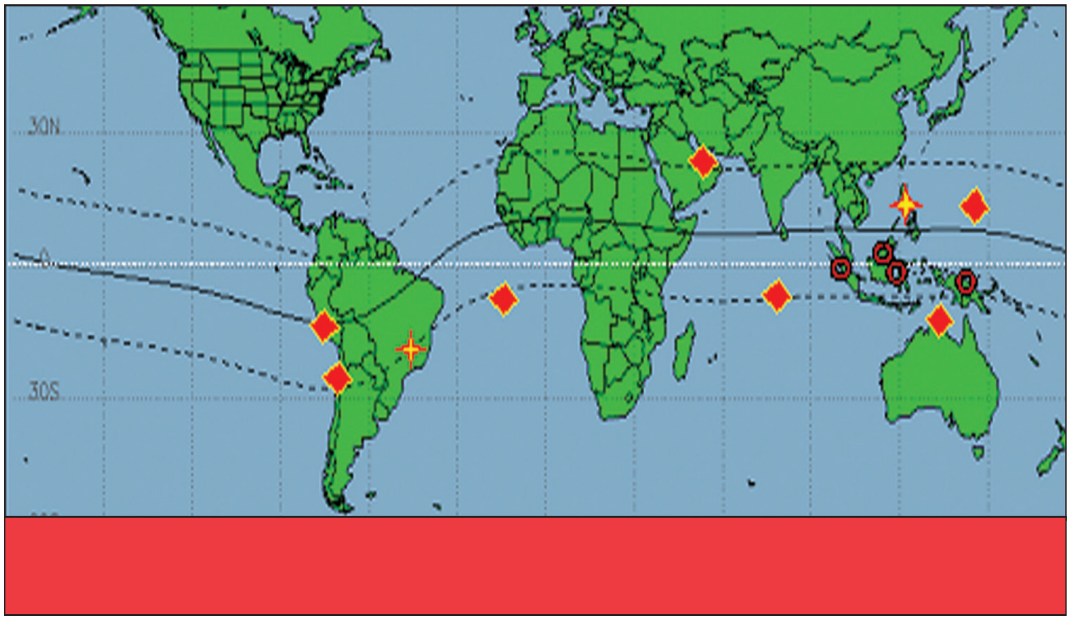
Science and Technology for Tomorrow's Aerospace Forces

Success Story

GLOBAL DEPLOYMENT OF SCINDA STATIONS



To help predict communication outages caused by naturally occurring changes in the ionosphere, Space Vehicles Directorate scientists recently completed installing ultra high frequency (UHF) satellite communications (SATCOM) and Global Positioning System (GPS) monitoring stations at seven locations around the earth's magnetic equator. Directorate researchers retrieve and compile scintillation data from available satellite links and ionospheric drift velocity data via the Internet to make tri-color maps of disturbance regions. The researchers then send these maps to SATCOM and GPS users along with forecasts of likely link outages.

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Accomplishment

Directorate scientists demonstrated the deployment of the scintillation network decision aid (SCINDA) concept using two stations in South America (Ancon, Peru and Antofagasta, Chile) to record scintillation parameters from UHF US Navy Fleet SATCOM and L-band (Geosynchronous Operational Environmental Satellites, GPS) satellite links. With the recent addition of five more stations in Ascension Island, Bahrain, Diego Garcia, Manila, and Guam, and in collaboration with Australia, sites at Papua, New Guinea, Indonesia, Malaysia, and North Australia, directorate scientists can now provide current, as well as forecast, SATCOM and GPS link parameters for large geographic areas. Data from this chain of SCINDA stations is providing a quantum leap in accuracy over climatological models in alerting and forecasting local scintillation occurrences and impacts.

Background

Scintillation is a rapid amplitude and phase fluctuation of satellite signals observed near the earth's surface, causing link degradation or outage. The most intense natural scintillation occurs during nighttime within 20% of the magnetic equator, a region where most of the United States' recent military operations occur.

Scintillation affects frequencies up to 2 gigahertz, but its primary impact is on UHF SATCOM in the 200-275 megahertz frequency range. Very intense scintillation can also degrade GPS location accuracy by limiting the number of satellites available for position fixes.

Space Vehicles
Emerging Technologies

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTT, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-VS-07)